



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5 CHICAGO REGIONAL LABORATORY

536 SOUTH CLARK STREET

CHICAGO, ILLINOIS 60605



Date: 1/27/2015

Subject: Review of Region 5 Data for BP Whiting Refinery

To: Air Division, US EPA Region 5
77 West Jackson Boulevard
Chicago, IL 60605

From: Wayne Whipple, Analyst
US EPA Region 5 Chicago Regional Laboratory

The data transmitted under this cover memo successfully passed CRL's data review procedures as documented in the current Quality Management Plan and applicable Standard Operating Procedures. In accordance with EPA's *Guidance on Environmental Data Verification and Data Validation* (Document EPA QA/G-8), CRL verified and validated the data but does not perform data quality assessment based on project plans.

This report was reviewed and the information provided herein accurately represents the analysis performed.

X

27 January, 2015

Please contact the analyst with any technical report issues, Amanda Wroble at (312)-353-0375 for sample project concerns, and Sylvia Griffin at (312)-353-9073 with data transmittal questions. Thank you.

Attached are Results for: BP Whiting Refinery

/ /

Data Management Coordinator and Date Transmitted

Analyses included in this report:

Air Toxics Reimer 5



Environmental Protection Agency Region 5

Chicago Regional Laboratory

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Phone:(312)353-8370 Fax:(312)886-2591

Air Division, US EPA Region 5
77 West Jackson Boulevard
Chicago IL, 60605

Project: BP Whiting Refinery
Project Number: [none]
Project Manager: Motria Caudill

Reported:
Jan-27-15 13:05

Analysis Case Narrative for Volatile Organic Compounds (VOC) Air Toxics

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General Information

Three 15 L canisters and two six liter canisters were received in good condition from the Air and Radiation Division monitoring group on September 25, 2014. The samples met hold time.

The samples were analyzed for VOC Air Toxics using SOP MS-005 Revision 6 with cold trap dehydration preconcentrator on Pegasus. (Reference Method US EPA TO-15).

Data are reported to a reporting limit of 35 pptv when possible and at least 35 pptv was requested in the Quality Assurance Project Plan, QAPP, "Quality Assurance Project Plan EPA Region 5 Sampling Method Comparison". All data quality objectives were met unless otherwise stated in this narrative.

Sample monitoring compounds 1,1,1-trichloroethane and dichlorotetrafluoroethane are reported below the reporting limits for tracking of the sample monitoring compound. The results are within the expected global results, although they are still flagged as estimated because they are below their reporting limits. The results for 1,1,1-trichloroethane are also within 5 times the blank result but it is already flagged as estimated so no further action is required.

The passive flow regulators for samples -04 and -05 that were collected in parallel through a single regulator were at ambient pressure. This was noted on the chain of custody form also.

Standard Operating Procedures (SOP) and Method Deviations

Method and canister blanks have criteria used for determining if system and/or canister contamination influences the sample results. That is, if the results of the sample are within 5 times the blank result the sample could be flagged for canister or method blank high bias (BC, B respectively) or the reporting limit raised to the concentration detected in the sample.

LCS limits are the CCV limits from the SOP and not the ones in the final report. The limits in the final report are for internal tracking purposes.

Sample Analysis and Results



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Propene is a combination of propane and propene that cannot be resolved. The compound is flagged K as a high bias. Propene is also flagged as research quality and further information describing this is below (paragraph 3 quality control section).

1,3-butadiene is coeluting with a C4 olefin and cannot be resolved sufficiently to provide quantitative determination. The compound is flagged as a high bias, K.

Propene, dichlorotetrafluoroethane, 1,1,2-trichloro-1,2,2-trifluoroethane (F-113), cyclohexane, 2-butanone, acrolein and acetone have their reporting limit raised to 50 pptv because the calibration curve lowest reporting limit was not acceptable up to the 50 pptv calibration level.

Acrolein is flagged high bias because of interferences from hydrocarbons in all the samples. The data cannot be resolved. It is very likely the results are a large overestimate.

4-Ethyltoluene appears to be coeluting with an unknown aromatic hydrocarbon that has a similar mass spectrum. The peak is asymmetric suggesting the coelution. The result is reported as 4-ethyl toluene but with a K flag suggesting a high bias from the coelution. The unknown suspected compound is most likely a similar aromatic hydrocarbon.

Quality Control

There was no duplicate analyzed for the first batch of samples in batch B409107. The reproducibility between the initial 200 cc injections performed on the first day and the results from the diluted samples taken on the second day were comparable and within precision limits for compounds detected above the reporting limit on the 5x dilution. No data is flagged for the lack of the duplicate in the initial run.

The sample select valve for the final CCV, B409107-BSD1 was set to the ICV standard can position. The ICV was twice as concentrated, and therefore the expected value is 2 x that of the nominal 500 pptv standard. To allow for the determination of reproducibility between the two CCVs a dilution of 0.5 was used. The difference between the two standard concentrations are certified to be less than the analytical uncertainty so the percent difference is not exact but does provide a useful estimate.

Isopropyl alcohol failed the calibration and is flagged J as estimated and has failed the initial demonstration of capability (IDOC). Acetone and ethanol also has failed the IDOC performance and accuracy and are flagged "J". Propene failed the method detection and performance and accuracy studies during the IDOC but the data may be useful for this study and are reported as research data which does not have appropriate QC documented in the laboratory. An overestimate "K" is also assigned and explained above for the propene/propane coelution described above.

Cyclohexane has extremely poor chromatography because of a coelution with an internal standard and therefore the results can only be estimated. This can be seen by failing the later blank spike (B412022-BSD1). All results for



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cyclohexane are flagged J. Cyclohexane and naphthalene failed the RPD duplicate check but they are already flagged J so no further qualifications are necessary.

Ethanol failed the final CCV in the first batch B409107 and is already qualified as estimated. Therefore in sample-01 through -04, which are the samples analyzed in that batch no additional qualifications are added.

Naphthalene is flagged as estimated "J" because the performance of the analytical system is not reliable.

Naphthalene has an acceptable calibration response above 250 pptv for that late eluting compound and it fails the second source calibration check (ICV) and the final CCV check for the second batch.

Acetone is over the calibration range in the duplicate analysis. It is flagged J and does not have an additional dilution for that sample because the dilution was reported for the original sample.

Sample Monitoring Compounds are chlorinated volatile organic compounds or halons that are found in the atmosphere and extremely constant throughout the planet. They are reportable data but are also used to track the assurance of the quality of the sample. The limits have been widened from the 90-120% listed in the sample reports to the 70-130% and 50-150% recovery listed in the pen and ink change.



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ANALYTICAL REPORT FOR SAMPLES

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|-----------|---------------|--------|-----------------|-----------------|
| 4 | 1409014-01 | Air | Sep-25-14 08:40 | Sep-25-14 15:15 |
| 1 | 1409014-02 | Air | Sep-25-14 09:30 | Sep-25-14 15:15 |
| 3 | 1409014-03 | Air | Sep-25-14 10:05 | Sep-25-14 15:15 |
| 2 | 1409014-04 | Air | Sep-25-14 11:00 | Sep-25-14 15:15 |
| 2 | 1409014-05 | Air | Sep-25-14 11:00 | Sep-25-14 15:15 |



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Project Manager: Motria Caudill

Reported:
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Air Toxics by GC/MS, EPA TO-15 (modified) US EPA Region 5 Chicago Regional Laboratory

4 (1409014-01) Air Sampled: Sep-25-14 08:40 Received: Sep-25-14 15:15

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed |
|---------------------------|--------|--------------------|-----|-----------------|-------|----------|---------|-----------|-----------|
| Propene | 1.99 | K, Research | | 0.0500 | ppbv | 1 | B409107 | Sep-25-14 | Sep-26-14 |
| Chloromethane | 0.496 | | | 0.0500 | " | " | " | " | " |
| Vinyl chloride | U | | | 0.0350 | " | " | " | " | " |
| 1,3-butadiene | 0.0652 | | | 0.0350 | " | " | " | " | " |
| Bromomethane | U | | | 0.0350 | " | " | " | " | " |
| Chloroethane | U | | | 0.0350 | " | " | " | " | " |
| Ethanol | 1.38 | J | | 0.0350 | " | " | " | " | " |
| Acrolein | 0.471 | K | | 0.0500 | " | " | " | " | " |
| Isopropyl alcohol | 0.387 | J | | 0.0350 | " | " | " | " | " |
| 1,1-Dichloroethene | U | | | 0.0350 | " | " | " | " | " |
| Methylene chloride | 0.141 | | | 0.0350 | " | " | " | " | " |
| Methyl tert-butyl ether | U | | | 0.0350 | " | " | " | " | " |
| 1,1-Dichloroethane | U | | | 0.0350 | " | " | " | " | " |
| Vinyl acetate | U | | | 0.0350 | " | " | " | " | " |
| Hexane | 0.292 | | | 0.0350 | " | " | " | " | " |
| 2-Butanone | 0.632 | | | 0.0500 | " | " | " | " | " |
| cis-1,2-Dichloroethene | U | | | 0.0350 | " | " | " | " | " |
| trans-1,2-Dichloroethene | U | | | 0.0350 | " | " | " | " | " |
| Chloroform | U | | | 0.0350 | " | " | " | " | " |
| Ethyl acetate | 0.167 | | | 0.0350 | " | " | " | " | " |
| 1,2-Dichloroethane | U | | | 0.0350 | " | " | " | " | " |
| Cyclohexane | 0.175 | J | | 0.0500 | " | " | " | " | " |
| Tetrahydrofuran | U | | | 0.0350 | " | " | " | " | " |
| Benzene | 0.237 | | | 0.0350 | " | " | " | " | " |
| n-Heptane | 0.131 | | | 0.0350 | " | " | " | " | " |
| 1,2-Dichloropropane | U | | | 0.0350 | " | " | " | " | " |
| Trichloroethene | U | | | 0.0350 | " | " | " | " | " |
| Bromodichloromethane | U | | | 0.0350 | " | " | " | " | " |
| Methyl methacrylate | U | | | 0.0350 | " | " | " | " | " |
| 1,4-Dioxane | U | | | 0.0350 | " | " | " | " | " |
| cis-1,3-Dichloropropene | U | | | 0.0350 | " | " | " | " | " |
| 4-Methyl-2-pentanone | 0.0557 | | | 0.0350 | " | " | " | " | " |
| trans-1,3-Dichloropropene | U | | | 0.0350 | " | " | " | " | " |
| 1,1,2-Trichloroethane | U | | | 0.0350 | " | " | " | " | " |
| Dibromochloromethane | U | | | 0.0350 | " | " | " | " | " |



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Air Toxics by GC/MS, EPA TO-15 (modified) US EPA Region 5 Chicago Regional Laboratory

4 (1409014-01) Air Sampled: Sep-25-14 08:40 Received: Sep-25-14 15:15

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed |
|---------------------------|---------------|--------------------|-----|-----------------|-------|----------|---------|-----------|-----------|
| Toluene | 0.560 | | | 0.0350 | ppbv | 1 | B409107 | Sep-25-14 | Sep-26-14 |
| 2-Hexanone | U | | | 0.0350 | " | " | " | " | " |
| 1,2-Dibromoethane (EDB) | U | | | 0.0350 | " | " | " | " | " |
| Tetrachloroethene | 0.0354 | | | 0.0350 | " | " | " | " | " |
| Chlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| Ethylbenzene | 0.0687 | | | 0.0350 | " | " | " | " | " |
| m+p-Xylene | 0.202 | | | 0.0700 | " | " | " | " | " |
| Bromoform | U | | | 0.0350 | " | " | " | " | " |
| Styrene | 0.0591 | | | 0.0350 | " | " | " | " | " |
| 1,1,2,2-Tetrachloroethane | U | | | 0.0350 | " | " | " | " | " |
| o-Xylene | 0.0725 | | | 0.0350 | " | " | " | " | " |
| 4-ethyltoluene | 0.0626 | K | | 0.0350 | " | " | " | " | " |
| 1,3,5-Trimethylbenzene | U | | | 0.0350 | " | " | " | " | " |
| 1,2,4-Trimethylbenzene | 0.0548 | | | 0.0350 | " | " | " | " | " |
| 1,3-Dichlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| Benzyl chloride | U | | | 0.0350 | " | " | " | " | " |
| 1,4-Dichlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| 1,2-Dichlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| 1,2,4-Trichlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| Naphthalene | 0.605 | J | | 0.0500 | " | " | " | " | " |

| Surrogate | Result | | %REC | %REC Limits | Batch | Prepared | Analyzed |
|--|---------|---|------|-------------|-------|----------|----------|
| Surrogate: Dichlorodifluoromethane | 0.454 | | 89% | 70-130 | " | " | " |
| Surrogate: Dichlorotetrafluoroethane | 0.0215 | J | 108% | 50-150 | " | " | " |
| Surrogate: Trichlorofluoromethane | 0.217 | | 92% | 70-130 | " | " | " |
| Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (F ₁) | 0.0772 | | 107% | 70-130 | " | " | " |
| Surrogate: 1,1,1-Trichloroethane | 3.99E-3 | J | 100% | 50-150 | " | " | " |
| Surrogate: Carbon tetrachloride | 0.0762 | | 92% | 70-130 | " | " | " |



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Air Toxics by GC/MS, EPA TO-15 (modified)
US EPA Region 5 Chicago Regional Laboratory

4 (1409014-01RE1) Air Sampled: Sep-25-14 08:40 Received: Sep-25-14 15:15

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed |
|---------|--------|--------------------|-----|-----------------|-------|----------|---------|-----------|-----------|
| Acetone | 3.05 | J | | 0.250 | ppbv | 5 | B412022 | Sep-29-14 | Sep-29-14 |

1 (1409014-02) Air Sampled: Sep-25-14 09:30 Received: Sep-25-14 15:15

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed |
|--------------------------|--------|--------------------|-----|-----------------|-------|----------|---------|-----------|-----------|
| Propene | 1.29 | K, Research | | 0.0500 | ppbv | 1 | B409107 | Sep-25-14 | Sep-26-14 |
| Chloromethane | 0.544 | | | 0.0500 | " | " | " | " | " |
| Vinyl chloride | U | | | 0.0350 | " | " | " | " | " |
| 1,3-butadiene | 0.0507 | K | | 0.0350 | " | " | " | " | " |
| Bromomethane | U | | | 0.0350 | " | " | " | " | " |
| Chloroethane | U | | | 0.0350 | " | " | " | " | " |
| Ethanol | 1.28 | J | | 0.0350 | " | " | " | " | " |
| Acrolein | 0.775 | K | | 0.0500 | " | " | " | " | " |
| Isopropyl alcohol | 0.173 | BC, J | | 0.0350 | " | " | " | " | " |
| 1,1-Dichloroethene | U | | | 0.0350 | " | " | " | " | " |
| Methylene chloride | 0.120 | BC | | 0.0350 | " | " | " | " | " |
| Methyl tert-butyl ether | U | | | 0.0350 | " | " | " | " | " |
| 1,1-Dichloroethane | U | | | 0.0350 | " | " | " | " | " |
| Vinyl acetate | U | | | 0.0350 | " | " | " | " | " |
| Hexane | 0.543 | | | 0.0350 | " | " | " | " | " |
| 2-Butanone | 0.431 | | | 0.0500 | " | " | " | " | " |
| cis-1,2-Dichloroethene | U | | | 0.0350 | " | " | " | " | " |
| trans-1,2-Dichloroethene | U | | | 0.0350 | " | " | " | " | " |
| Chloroform | U | | | 0.0350 | " | " | " | " | " |
| Ethyl acetate | 0.135 | | | 0.0350 | " | " | " | " | " |
| 1,2-Dichloroethane | U | | | 0.0350 | " | " | " | " | " |
| Cyclohexane | 0.404 | J | | 0.0500 | " | " | " | " | " |
| Tetrahydrofuran | U | | | 0.0350 | " | " | " | " | " |
| Benzene | 0.266 | | | 0.0350 | " | " | " | " | " |
| n-Heptane | 0.302 | | | 0.0350 | " | " | " | " | " |
| 1,2-Dichloropropane | U | | | 0.0350 | " | " | " | " | " |
| Trichloroethene | U | | | 0.0350 | " | " | " | " | " |
| Bromodichloromethane | U | | | 0.0350 | " | " | " | " | " |
| Methyl methacrylate | U | | | 0.0350 | " | " | " | " | " |
| 1,4-Dioxane | U | | | 0.0350 | " | " | " | " | " |



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1 (1409014-02) Air Sampled: Sep-25-14 09:30 Received: Sep-25-14 15:15

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed |
|---------------------------|--------|--------------------|-----|-----------------|-------|----------|---------|-----------|-----------|
| cis-1,3-Dichloropropene | U | | | 0.0350 | ppbv | 1 | B409107 | Sep-25-14 | Sep-26-14 |
| 4-Methyl-2-pentanone | 0.0724 | | | 0.0350 | " | " | " | " | " |
| trans-1,3-Dichloropropene | U | | | 0.0350 | " | " | " | " | " |
| 1,1,2-Trichloroethane | U | | | 0.0350 | " | " | " | " | " |
| Dibromochloromethane | U | | | 0.0350 | " | " | " | " | " |
| Toluene | 0.858 | | | 0.0350 | " | " | " | " | " |
| 2-Hexanone | U | | | 0.0350 | " | " | " | " | " |
| 1,2-Dibromoethane (EDB) | U | | | 0.0350 | " | " | " | " | " |
| Tetrachloroethene | U | BC | | 0.0350 | " | " | " | " | " |
| Chlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| Ethylbenzene | 0.130 | | | 0.0350 | " | " | " | " | " |
| m+p-Xylene | 0.383 | | | 0.0700 | " | " | " | " | " |
| Bromoform | U | | | 0.0350 | " | " | " | " | " |
| Styrene | U | | | 0.0350 | " | " | " | " | " |
| 1,1,2,2-Tetrachloroethane | U | | | 0.0350 | " | " | " | " | " |
| o-Xylene | 0.137 | | | 0.0350 | " | " | " | " | " |
| 4-ethyltoluene | 0.127 | K | | 0.0350 | " | " | " | " | " |
| 1,3,5-Trimethylbenzene | 0.0376 | | | 0.0350 | " | " | " | " | " |
| 1,2,4-Trimethylbenzene | 0.124 | | | 0.0350 | " | " | " | " | " |
| 1,3-Dichlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| Benzyl chloride | U | | | 0.0350 | " | " | " | " | " |
| 1,4-Dichlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| 1,2-Dichlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| 1,2,4-Trichlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| Naphthalene | 0.613 | BC, J | | 0.0500 | " | " | " | " | " |

| Surrogate | Result | | %REC | %REC Limits | Batch | Prepared | Analyzed |
|--|---------|---|------|-------------|-------|----------|----------|
| Surrogate: Dichlorodifluoromethane | 0.462 | | 91% | 70-130 | " | " | " |
| Surrogate: Dichlorotetrafluoroethane | 0.0211 | J | 106% | 50-150 | " | " | " |
| Surrogate: Trichlorofluoromethane | 0.217 | | 92% | 70-130 | " | " | " |
| Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113) | 0.0780 | | 108% | 70-130 | " | " | " |
| Surrogate: 1,1,1-Trichloroethane | 4.01E-3 | J | 100% | 50-150 | " | " | " |
| Surrogate: Carbon tetrachloride | 0.0763 | | 92% | 70-130 | " | " | " |



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1 (1409014-02RE1) Air Sampled: Sep-25-14 09:30 Received: Sep-25-14 15:15

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed |
|---------|--------|--------------------|-----|-----------------|-------|----------|---------|-----------|-----------|
| Acetone | 2.24 | BC, J | | 0.250 | ppbv | 5 | B412022 | Sep-29-14 | Sep-29-14 |

3 (1409014-03) Air Sampled: Sep-25-14 10:05 Received: Sep-25-14 15:15

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed |
|--------------------------|--------|--------------------|-----|-----------------|-------|----------|---------|-----------|-----------|
| Propene | 1.44 | Research | | 0.0500 | ppbv | 1 | B409107 | Sep-25-14 | Sep-26-14 |
| Chloromethane | 0.504 | | | 0.0500 | " | " | " | " | " |
| Vinyl chloride | U | | | 0.0350 | " | " | " | " | " |
| 1,3-butadiene | 0.0460 | K | | 0.0350 | " | " | " | " | " |
| Bromomethane | U | | | 0.0350 | " | " | " | " | " |
| Chloroethane | U | | | 0.0350 | " | " | " | " | " |
| Ethanol | 1.46 | J | | 0.0350 | " | " | " | " | " |
| Acrolein | 0.564 | K | | 0.0500 | " | " | " | " | " |
| Isopropyl alcohol | 0.178 | BC, J | | 0.0350 | " | " | " | " | " |
| 1,1-Dichloroethene | U | | | 0.0350 | " | " | " | " | " |
| Methylene chloride | 0.121 | BC | | 0.0350 | " | " | " | " | " |
| Methyl tert-butyl ether | U | | | 0.0350 | " | " | " | " | " |
| 1,1-Dichloroethane | U | | | 0.0350 | " | " | " | " | " |
| Vinyl acetate | U | | | 0.0350 | " | " | " | " | " |
| Hexane | 0.333 | | | 0.0350 | " | " | " | " | " |
| 2-Butanone | 0.453 | | | 0.0500 | " | " | " | " | " |
| cis-1,2-Dichloroethene | U | | | 0.0350 | " | " | " | " | " |
| trans-1,2-Dichloroethene | U | | | 0.0350 | " | " | " | " | " |
| Chloroform | U | | | 0.0350 | " | " | " | " | " |
| Ethyl acetate | 0.0680 | | | 0.0350 | " | " | " | " | " |
| 1,2-Dichloroethane | U | | | 0.0350 | " | " | " | " | " |
| Cyclohexane | 0.204 | J | | 0.0500 | " | " | " | " | " |
| Tetrahydrofuran | U | | | 0.0350 | " | " | " | " | " |
| Benzene | 0.196 | | | 0.0350 | " | " | " | " | " |
| n-Heptane | 0.155 | | | 0.0350 | " | " | " | " | " |
| 1,2-Dichloropropane | U | | | 0.0350 | " | " | " | " | " |
| Trichloroethene | U | | | 0.0350 | " | " | " | " | " |
| Bromodichloromethane | U | | | 0.0350 | " | " | " | " | " |
| Methyl methacrylate | U | | | 0.0350 | " | " | " | " | " |
| 1,4-Dioxane | U | | | 0.0350 | " | " | " | " | " |



Environmental Protection Agency Region 5 Chicago Regional Laboratory

536 South Clark Street, Chicago, IL 60605
Phone:(312)353-8370 Fax:(312)886-2591

Air Division, US EPA Region 5
77 West Jackson Boulevard
Chicago IL, 60605

Project: BP Whiting Refinery
Project Number: [none]
Project Manager: Motria Caudill

Reported:
Jan-27-15 13:05

Air Toxics by GC/MS, EPA TO-15 (modified) US EPA Region 5 Chicago Regional Laboratory

3 (1409014-03) Air Sampled: Sep-25-14 10:05 Received: Sep-25-14 15:15

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed |
|---------------------------|--------|--------------------|-----|-----------------|-------|----------|---------|-----------|-----------|
| cis-1,3-Dichloropropene | U | | | 0.0350 | ppbv | 1 | B409107 | Sep-25-14 | Sep-26-14 |
| 4-Methyl-2-pentanone | 0.0735 | | | 0.0350 | " | " | " | " | " |
| trans-1,3-Dichloropropene | U | | | 0.0350 | " | " | " | " | " |
| 1,1,2-Trichloroethane | U | | | 0.0350 | " | " | " | " | " |
| Dibromochloromethane | U | | | 0.0350 | " | " | " | " | " |
| Toluene | 0.507 | BC | | 0.0350 | " | " | " | " | " |
| 2-Hexanone | U | | | 0.0350 | " | " | " | " | " |
| 1,2-Dibromoethane (EDB) | U | | | 0.0350 | " | " | " | " | " |
| Tetrachloroethene | U | | | 0.0350 | " | " | " | " | " |
| Chlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| Ethylbenzene | 0.0836 | | | 0.0350 | " | " | " | " | " |
| m+p-Xylene | 0.257 | | | 0.0700 | " | " | " | " | " |
| Bromoform | U | | | 0.0350 | " | " | " | " | " |
| Styrene | U | | | 0.0350 | " | " | " | " | " |
| 1,1,2,2-Tetrachloroethane | U | | | 0.0350 | " | " | " | " | " |
| o-Xylene | 0.0920 | | | 0.0350 | " | " | " | " | " |
| 4-ethyltoluene | 0.0722 | K | | 0.0350 | " | " | " | " | " |
| 1,3,5-Trimethylbenzene | U | | | 0.0350 | " | " | " | " | " |
| 1,2,4-Trimethylbenzene | 0.0693 | | | 0.0350 | " | " | " | " | " |
| 1,3-Dichlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| Benzyl chloride | U | | | 0.0350 | " | " | " | " | " |
| 1,4-Dichlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| 1,2-Dichlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| 1,2,4-Trichlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| Naphthalene | 0.565 | B, BC, J | | 0.0500 | " | " | " | " | " |

| Surrogate | Result | | %REC | %REC Limits | Batch | Prepared | Analyzed |
|---|---------|---|------|-------------|-------|----------|----------|
| Surrogate: Dichlorodifluoromethane | 0.456 | | 89% | 70-130 | " | " | " |
| Surrogate: Dichlorotetrafluoroethane | 0.0213 | J | 107% | 50-150 | " | " | " |
| Surrogate: Trichlorofluoromethane | 0.219 | | 93% | 70-130 | " | " | " |
| Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (F110) | 0.0796 | | 110% | 70-130 | " | " | " |
| Surrogate: 1,1,1-Trichloroethane | 3.69E-3 | J | 92% | 50-150 | " | " | " |
| Surrogate: Carbon tetrachloride | 0.0768 | | 93% | 70-130 | " | " | " |



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Chicago Regional Laboratory

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Project: BP Whiting Refinery
Project Number: [none]
Project Manager: Motria Caudill

Reported:
Jan-27-15 13:05

Air Toxics by GC/MS, EPA TO-15 (modified)
US EPA Region 5 Chicago Regional Laboratory

3 (1409014-03RE1) Air Sampled: Sep-25-14 10:05 Received: Sep-25-14 15:15

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed |
|---------|--------|--------------------|-----|-----------------|-------|----------|---------|-----------|-----------|
| Acetone | 2.08 | BC, J | | 0.250 | ppbv | 5 | B412022 | Sep-29-14 | Sep-29-14 |

2 (1409014-04) Air Sampled: Sep-25-14 11:00 Received: Sep-25-14 15:15

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed |
|--------------------------|--------|--------------------|-----|-----------------|-------|----------|---------|-----------|-----------|
| Propene | 1.38 | K, Research | | 0.0500 | ppbv | 1 | B409107 | Sep-25-14 | Sep-26-14 |
| Chloromethane | 0.522 | | | 0.0500 | " | " | " | " | " |
| Vinyl chloride | U | | | 0.0350 | " | " | " | " | " |
| 1,3-butadiene | 0.0382 | K | | 0.0350 | " | " | " | " | " |
| Bromomethane | U | | | 0.0350 | " | " | " | " | " |
| Chloroethane | U | | | 0.0350 | " | " | " | " | " |
| Ethanol | 1.58 | J | | 0.0350 | " | " | " | " | " |
| Acrolein | 0.567 | K | | 0.0500 | " | " | " | " | " |
| Isopropyl alcohol | 0.105 | J | | 0.0350 | " | " | " | " | " |
| 1,1-Dichloroethene | U | | | 0.0350 | " | " | " | " | " |
| Methylene chloride | 0.120 | | | 0.0350 | " | " | " | " | " |
| Methyl tert-butyl ether | U | | | 0.0350 | " | " | " | " | " |
| 1,1-Dichloroethane | U | | | 0.0350 | " | " | " | " | " |
| Vinyl acetate | U | | | 0.0350 | " | " | " | " | " |
| Hexane | 0.419 | | | 0.0350 | " | " | " | " | " |
| 2-Butanone | 1.41 | | | 0.0500 | " | " | " | " | " |
| cis-1,2-Dichloroethene | U | | | 0.0350 | " | " | " | " | " |
| trans-1,2-Dichloroethene | U | | | 0.0350 | " | " | " | " | " |
| Chloroform | U | | | 0.0350 | " | " | " | " | " |
| Ethyl acetate | 0.0747 | | | 0.0350 | " | " | " | " | " |
| 1,2-Dichloroethane | U | | | 0.0350 | " | " | " | " | " |
| Cyclohexane | 0.262 | J | | 0.0500 | " | " | " | " | " |
| Tetrahydrofuran | U | | | 0.0350 | " | " | " | " | " |
| Benzene | 0.233 | | | 0.0350 | " | " | " | " | " |
| n-Heptane | 0.210 | | | 0.0350 | " | " | " | " | " |
| 1,2-Dichloropropane | U | | | 0.0350 | " | " | " | " | " |
| Trichloroethene | U | | | 0.0350 | " | " | " | " | " |
| Bromodichloromethane | U | | | 0.0350 | " | " | " | " | " |
| Methyl methacrylate | U | | | 0.0350 | " | " | " | " | " |
| 1,4-Dioxane | U | | | 0.0350 | " | " | " | " | " |



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Project: BP Whiting Refinery
Project Number: [none]
Project Manager: Motria Caudill

Reported:
Jan-27-15 13:05

Air Toxics by GC/MS, EPA TO-15 (modified) US EPA Region 5 Chicago Regional Laboratory

2 (1409014-04) Air Sampled: Sep-25-14 11:00 Received: Sep-25-14 15:15

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed |
|---------------------------|--------|--------------------|-----|-----------------|-------|----------|---------|-----------|-----------|
| cis-1,3-Dichloropropene | U | | | 0.0350 | ppbv | 1 | B409107 | Sep-25-14 | Sep-26-14 |
| 4-Methyl-2-pentanone | 0.497 | | | 0.0350 | " | " | " | " | " |
| trans-1,3-Dichloropropene | U | | | 0.0350 | " | " | " | " | " |
| 1,1,2-Trichloroethane | U | | | 0.0350 | " | " | " | " | " |
| Dibromochloromethane | U | | | 0.0350 | " | " | " | " | " |
| Toluene | 0.740 | | | 0.0350 | " | " | " | " | " |
| 2-Hexanone | U | | | 0.0350 | " | " | " | " | " |
| 1,2-Dibromoethane (EDB) | U | | | 0.0350 | " | " | " | " | " |
| Tetrachloroethene | U | | | 0.0350 | " | " | " | " | " |
| Chlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| Ethylbenzene | 0.198 | | | 0.0350 | " | " | " | " | " |
| m+p-Xylene | 0.610 | | | 0.0700 | " | " | " | " | " |
| Bromoform | U | | | 0.0350 | " | " | " | " | " |
| Styrene | U | | | 0.0350 | " | " | " | " | " |
| 1,1,2,2-Tetrachloroethane | U | | | 0.0350 | " | " | " | " | " |
| o-Xylene | 0.216 | | | 0.0350 | " | " | " | " | " |
| 4-ethyltoluene | 0.0936 | K | | 0.0350 | " | " | " | " | " |
| 1,3,5-Trimethylbenzene | U | | | 0.0350 | " | " | " | " | " |
| 1,2,4-Trimethylbenzene | 0.0820 | | | 0.0350 | " | " | " | " | " |
| 1,3-Dichlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| Benzyl chloride | U | | | 0.0350 | " | " | " | " | " |
| 1,4-Dichlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| 1,2-Dichlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| 1,2,4-Trichlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| Naphthalene | 0.571 | B, J | | 0.0500 | " | " | " | " | " |

| Surrogate | Result | | %REC | %REC Limits | Batch | Prepared | Analyzed |
|--|---------|---|------|-------------|-------|----------|----------|
| Surrogate: Dichlorodifluoromethane | 0.469 | | 92% | 70-130 | " | " | " |
| Surrogate: Dichlorotetrafluoroethane | 0.0217 | J | 109% | 50-150 | " | " | " |
| Surrogate: Trichlorofluoromethane | 0.221 | | 94% | 70-130 | " | " | " |
| Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113) | 0.0796 | | 110% | 70-130 | " | " | " |
| Surrogate: 1,1,1-Trichloroethane | 3.75E-3 | J | 94% | 50-150 | " | " | " |
| Surrogate: Carbon tetrachloride | 0.0777 | | 94% | 70-130 | " | " | " |



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Chicago Regional Laboratory

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Project: BP Whiting Refinery
Project Number: [none]
Project Manager: Motria Caudill

Reported:
Jan-27-15 13:05

Air Toxics by GC/MS, EPA TO-15 (modified)
US EPA Region 5 Chicago Regional Laboratory

2 (1409014-04RE1) Air Sampled: Sep-25-14 11:00 Received: Sep-25-14 15:15

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed |
|---------|--------|--------------------|-----|-----------------|-------|----------|---------|-----------|-----------|
| Acetone | 2.51 | J, BC | | 0.250 | ppbv | 5 | B412022 | Sep-29-14 | Sep-29-14 |

2 (1409014-05) Air Sampled: Sep-25-14 11:00 Received: Sep-25-14 15:15

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed |
|--------------------------|--------|--------------------|-----|-----------------|-------|----------|---------|-----------|-----------|
| Propene | 1.32 | K, Research | | 0.0500 | ppbv | 1 | B412022 | Sep-29-14 | Sep-29-14 |
| Chloromethane | 0.512 | | | 0.0500 | " | " | " | " | " |
| Vinyl chloride | U | | | 0.0350 | " | " | " | " | " |
| 1,3-butadiene | U | K | | 0.0350 | " | " | " | " | " |
| Bromomethane | U | | | 0.0350 | " | " | " | " | " |
| Chloroethane | U | | | 0.0350 | " | " | " | " | " |
| Ethanol | 1.41 | J | | 0.0350 | " | " | " | " | " |
| Acrolein | 0.531 | K | | 0.0500 | " | " | " | " | " |
| Isopropyl alcohol | U | J | | 0.0350 | " | " | " | " | " |
| 1,1-Dichloroethene | U | | | 0.0350 | " | " | " | " | " |
| Methylene chloride | 0.117 | | | 0.0350 | " | " | " | " | " |
| Methyl tert-butyl ether | U | | | 0.0350 | " | " | " | " | " |
| 1,1-Dichloroethane | U | | | 0.0350 | " | " | " | " | " |
| Vinyl acetate | U | | | 0.0350 | " | " | " | " | " |
| Hexane | 0.396 | | | 0.0350 | " | " | " | " | " |
| 2-Butanone | 1.40 | | | 0.0500 | " | " | " | " | " |
| cis-1,2-Dichloroethene | U | | | 0.0350 | " | " | " | " | " |
| trans-1,2-Dichloroethene | U | | | 0.0350 | " | " | " | " | " |
| Chloroform | U | | | 0.0350 | " | " | " | " | " |
| Ethyl acetate | 0.0648 | | | 0.0350 | " | " | " | " | " |
| 1,2-Dichloroethane | U | | | 0.0350 | " | " | " | " | " |
| Cyclohexane | 0.305 | J | | 0.0500 | " | " | " | " | " |
| Tetrahydrofuran | U | | | 0.0350 | " | " | " | " | " |
| Benzene | 0.225 | | | 0.0350 | " | " | " | " | " |
| n-Heptane | 0.195 | | | 0.0350 | " | " | " | " | " |
| 1,2-Dichloropropane | U | | | 0.0350 | " | " | " | " | " |
| Trichloroethene | U | | | 0.0350 | " | " | " | " | " |
| Bromodichloromethane | U | | | 0.0350 | " | " | " | " | " |
| Methyl methacrylate | U | | | 0.0350 | " | " | " | " | " |
| 1,4-Dioxane | U | | | 0.0350 | " | " | " | " | " |
| cis-1,3-Dichloropropene | U | | | 0.0350 | " | " | " | " | " |



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Project: BP Whiting Refinery
Project Number: [none]
Project Manager: Motria Caudill

Reported:
Jan-27-15 13:05

Air Toxics by GC/MS, EPA TO-15 (modified) US EPA Region 5 Chicago Regional Laboratory

2 (1409014-05) Air Sampled: Sep-25-14 11:00 Received: Sep-25-14 15:15

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed |
|---------------------------|--------|--------------------|-----|-----------------|-------|----------|---------|-----------|-----------|
| 4-Methyl-2-pentanone | 0.518 | | | 0.0350 | ppbv | 1 | B412022 | Sep-29-14 | Sep-29-14 |
| trans-1,3-Dichloropropene | U | | | 0.0350 | " | " | " | " | " |
| 1,1,2-Trichloroethane | U | | | 0.0350 | " | " | " | " | " |
| Dibromochloromethane | U | | | 0.0350 | " | " | " | " | " |
| Toluene | 0.728 | | | 0.0350 | " | " | " | " | " |
| 2-Hexanone | U | | | 0.0350 | " | " | " | " | " |
| 1,2-Dibromoethane (EDB) | U | | | 0.0350 | " | " | " | " | " |
| Tetrachloroethene | U | | | 0.0350 | " | " | " | " | " |
| Chlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| Ethylbenzene | 0.199 | | | 0.0350 | " | " | " | " | " |
| m+p-Xylene | 0.612 | | | 0.0700 | " | " | " | " | " |
| Bromoform | U | | | 0.0350 | " | " | " | " | " |
| Styrene | U | | | 0.0350 | " | " | " | " | " |
| 1,1,2,2-Tetrachloroethane | U | | | 0.0350 | " | " | " | " | " |
| o-Xylene | 0.214 | | | 0.0350 | " | " | " | " | " |
| 4-ethyltoluene | 0.0962 | K | | 0.0350 | " | " | " | " | " |
| 1,3,5-Trimethylbenzene | U | | | 0.0350 | " | " | " | " | " |
| 1,2,4-Trimethylbenzene | 0.0844 | | | 0.0350 | " | " | " | " | " |
| 1,3-Dichlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| Benzyl chloride | U | | | 0.0350 | " | " | " | " | " |
| 1,4-Dichlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| 1,2-Dichlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| 1,2,4-Trichlorobenzene | U | | | 0.0350 | " | " | " | " | " |
| Naphthalene | 0.626 | J | | 0.0500 | " | " | " | " | " |

| Surrogate | Result | | %REC | %REC Limits | Batch | Prepared | Analyzed |
|--|---------|---|------|-------------|-------|----------|----------|
| Surrogate: Dichlorodifluoromethane | 0.470 | | 92% | 70-130 | " | " | " |
| Surrogate: Dichlorotetrafluoroethane | 0.0193 | J | 96% | 50-150 | " | " | " |
| Surrogate: Trichlorofluoromethane | 0.219 | | 93% | 70-130 | " | " | " |
| Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113) | 0.0788 | | 110% | 70-130 | " | " | " |
| Surrogate: 1,1,1-Trichloroethane | 3.82E-3 | J | 96% | 50-150 | " | " | " |
| Surrogate: Carbon tetrachloride | 0.0777 | | 94% | 70-130 | " | " | " |



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Project: BP Whiting Refinery
Project Number: [none]
Project Manager: Motria Caudill

Reported:
Jan-27-15 13:05

Air Toxics by GC/MS, EPA TO-15 (modified)
US EPA Region 5 Chicago Regional Laboratory

2 (1409014-05RE1) Air Sampled: Sep-25-14 11:00 Received: Sep-25-14 15:15

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Dilution | Batch | Prepared | Analyzed |
|---------|--------|--------------------|-----|-----------------|-------|----------|---------|-----------|-----------|
| Acetone | 2.32 | J | | 0.250 | ppbv | 5 | B412022 | Sep-29-14 | Sep-29-14 |



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Project: BP Whiting Refinery
Project Number: [none]
Project Manager: Motria Caudill

Reported:
Jan-27-15 13:05

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control US EPA Region 5 Chicago Regional Laboratory

Batch B409107 - ColdTrap Dehydration

| Blank (B409107-BLK1) | | | | | | | | | | | |
|--------------------------|--------|--------------------|-----|---|-------|-------------|---------------|-----------|------------|-----------|--|
| Analyte | Result | Flags / Qualifiers | MDL | Prepared: Sep-25-14 Analyzed: Sep-26-14 | | Spike Level | Source Result | %REC %REC | Limits RPD | RPD Limit | |
| | | | | Reporting Limit | Units | | | | | | |
| Propene | U | Research | | 0.0500 | ppbv | | | | | | |
| Chloromethane | U | | | 0.0500 | " | | | | | | |
| Vinyl chloride | U | | | 0.0350 | " | | | | | | |
| 1,3-butadiene | U | | | 0.0350 | " | | | | | | |
| Bromomethane | U | | | 0.0350 | " | | | | | | |
| Chloroethane | U | | | 0.0350 | " | | | | | | |
| Ethanol | 0.0551 | J | | 0.0350 | " | | | | | | |
| Acrolein | U | | | 0.0500 | " | | | | | | |
| Isopropyl alcohol | U | J | | 0.0350 | " | | | | | | |
| Acetone | U | J | | 0.0500 | " | | | | | | |
| 1,1-Dichloroethene | U | | | 0.0350 | " | | | | | | |
| Methylene chloride | U | | | 0.0350 | " | | | | | | |
| Methyl tert-butyl ether | U | | | 0.0350 | " | | | | | | |
| 1,1-Dichloroethane | U | | | 0.0350 | " | | | | | | |
| Vinyl acetate | U | | | 0.0350 | " | | | | | | |
| Hexane | U | | | 0.0350 | " | | | | | | |
| 2-Butanone | U | | | 0.0500 | " | | | | | | |
| cis-1,2-Dichloroethene | U | | | 0.0350 | " | | | | | | |
| trans-1,2-Dichloroethene | U | | | 0.0350 | " | | | | | | |
| Chloroform | U | | | 0.0350 | " | | | | | | |
| Ethyl acetate | U | | | 0.0350 | " | | | | | | |
| 1,2-Dichloroethane | U | | | 0.0350 | " | | | | | | |
| Cyclohexane | U | J | | 0.0500 | " | | | | | | |
| Tetrahydrofuran | U | | | 0.0350 | " | | | | | | |
| Benzene | U | | | 0.0350 | " | | | | | | |
| n-Heptane | U | | | 0.0350 | " | | | | | | |
| 1,2-Dichloropropane | U | | | 0.0350 | " | | | | | | |
| Trichloroethene | U | | | 0.0350 | " | | | | | | |
| Bromodichloromethane | U | | | 0.0350 | " | | | | | | |
| Methyl methacrylate | U | | | 0.0350 | " | | | | | | |
| 1,4-Dioxane | U | | | 0.0350 | " | | | | | | |
| cis-1,3-Dichloropropene | U | | | 0.0350 | " | | | | | | |
| 4-Methyl-2-pentanone | U | | | 0.0350 | " | | | | | | |



Environmental Protection Agency Region 5 Chicago Regional Laboratory

536 South Clark Street, Chicago, IL 60605
Phone:(312)353-8370 Fax:(312)886-2591

Air Division, US EPA Region 5
77 West Jackson Boulevard
Chicago IL, 60605

Project: BP Whiting Refinery
Project Number: [none]
Project Manager: Motria Caudill

Reported:
Jan-27-15 13:05

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control US EPA Region 5 Chicago Regional Laboratory

Batch B409107 - ColdTrap Dehydration

| Blank (B409107-BLK1) | | | | | | | | | | | Prepared: Sep-25-14 Analyzed: Sep-26-14 | | | |
|--|--------|--------------------|-----|-----------------|-------|-------------|---------------|------|-------------|-----|---|--|--|--|
| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | | | |
| trans-1,3-Dichloropropene | U | | | 0.0350 | ppbv | | | | | | | | | |
| 1,1,2-Trichloroethane | U | | | 0.0350 | " | | | | | | | | | |
| Dibromochloromethane | U | | | 0.0350 | " | | | | | | | | | |
| Toluene | U | | | 0.0350 | " | | | | | | | | | |
| 2-Hexanone | U | | | 0.0350 | " | | | | | | | | | |
| 1,2-Dibromoethane (EDB) | U | | | 0.0350 | " | | | | | | | | | |
| Tetrachloroethene | U | | | 0.0350 | " | | | | | | | | | |
| Chlorobenzene | U | | | 0.0350 | " | | | | | | | | | |
| Ethylbenzene | U | | | 0.0350 | " | | | | | | | | | |
| m+p-Xylene | U | | | 0.0700 | " | | | | | | | | | |
| Bromoform | U | | | 0.0350 | " | | | | | | | | | |
| Styrene | U | | | 0.0350 | " | | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | U | | | 0.0350 | " | | | | | | | | | |
| o-Xylene | U | | | 0.0350 | " | | | | | | | | | |
| 4-ethyltoluene | U | | | 0.0350 | " | | | | | | | | | |
| 1,3,5-Trimethylbenzene | U | | | 0.0350 | " | | | | | | | | | |
| 1,2,4-Trimethylbenzene | U | | | 0.0350 | " | | | | | | | | | |
| 1,3-Dichlorobenzene | U | | | 0.0350 | " | | | | | | | | | |
| Benzyl chloride | U | | | 0.0350 | " | | | | | | | | | |
| 1,4-Dichlorobenzene | U | | | 0.0350 | " | | | | | | | | | |
| 1,2-Dichlorobenzene | U | | | 0.0350 | " | | | | | | | | | |
| 1,2,4-Trichlorobenzene | U | | | 0.0350 | " | | | | | | | | | |
| Naphthalene | 0.115 | J | | 0.0500 | " | | | | | | | | | |
| Surrogate: Dichlorodifluoromethane | U | | | | " | 0.5100 | | % | 70-130 | | | | | |
| Surrogate: Dichlorotetrafluoroethane | U | | | | " | 2.000E-2 | | % | 70-130 | | | | | |
| Surrogate: Trichlorofluoromethane | U | | | | " | 0.2350 | | % | 70-130 | | | | | |
| Surrogate: | U | | | | " | 7.200E-2 | | % | 70-130 | | | | | |
| 1,1,2-trichloro-1,2,2-trifluoroethane (Freon | | | | | | | | | | | | | | |
| Surrogate: 1,1,1-Trichloroethane | U | | | | " | 4.000E-3 | | % | 70-130 | | | | | |
| Surrogate: Carbon tetrachloride | U | | | | " | 8.300E-2 | | % | 70-130 | | | | | |



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Project Manager: Motria Caudill

Reported:
Jan-27-15 13:05

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control US EPA Region 5 Chicago Regional Laboratory

Batch B409107 - ColdTrap Dehydration

| LCS (B409107-BS1) | | | | | | | | | | |
|---------------------------|--------|--------------------|-----|-----------|-------|-------------|---------------|-----------|------------|-----------|
| Analyte | Result | Flags / Qualifiers | MDL | Reporting | | Spike Level | Source Result | %REC %REC | Limits RPD | RPD Limit |
| | | | | Limit | Units | | | | | |
| Propene | 0.445 | Research | | 0.0500 | ppbv | 0.5000 | | 89% | 76-112 | |
| Chloromethane | 0.478 | | | 0.0500 | " | 0.5000 | | 96% | 77.6-116 | |
| Vinyl chloride | 0.499 | | | 0.0350 | " | 0.5000 | | 100% | 77.4-117 | |
| 1,3-butadiene | 0.490 | | | 0.0350 | " | 0.5000 | | 98% | 77.7-115 | |
| Bromomethane | 0.499 | | | 0.0350 | " | 0.5000 | | 100% | 75.2-117 | |
| Chloroethane | 0.494 | | | 0.0350 | " | 0.5000 | | 99% | 79.8-114 | |
| Ethanol | 0.513 | J | | 0.0350 | " | 0.5000 | | 103% | 50-124 | |
| Acrolein | 0.489 | | | 0.0500 | " | 0.5000 | | 98% | 67.9-130 | |
| Isopropyl alcohol | 0.510 | J | | 0.0350 | " | 0.5000 | | 102% | 81-106 | |
| Acetone | 0.495 | J | | 0.0500 | " | 0.5000 | | 99% | 60-137 | |
| 1,1-Dichloroethene | 0.493 | | | 0.0350 | " | 0.5000 | | 99% | 77.3-118 | |
| Methylene chloride | 0.498 | | | 0.0350 | " | 0.5000 | | 100% | 78.7-117 | |
| Methyl tert-butyl ether | 0.492 | | | 0.0350 | " | 0.5000 | | 98% | 79.1-118 | |
| 1,1-Dichloroethane | 0.495 | | | 0.0350 | " | 0.5000 | | 99% | 79.8-117 | |
| Vinyl acetate | 0.494 | | | 0.0350 | " | 0.5000 | | 99% | 85-106 | |
| Hexane | 0.489 | | | 0.0350 | " | 0.5000 | | 98% | 70.1-121 | |
| 2-Butanone | 0.480 | | | 0.0500 | " | 0.5000 | | 96% | 82-108 | |
| cis-1,2-Dichloroethene | 0.497 | | | 0.0350 | " | 0.5000 | | 99% | 78.1-115 | |
| trans-1,2-Dichloroethene | 0.491 | | | 0.0350 | " | 0.5000 | | 98% | 0-200 | |
| Chloroform | 0.497 | | | 0.0350 | " | 0.5000 | | 99% | 79.6-115 | |
| Ethyl acetate | 0.493 | | | 0.0350 | " | 0.5000 | | 99% | 0-200 | |
| 1,2-Dichloroethane | 0.502 | | | 0.0350 | " | 0.5000 | | 100% | 79.8-115 | |
| Cyclohexane | 0.470 | J | | 0.0500 | " | 0.5000 | | 94% | 72.5-119 | |
| Tetrahydrofuran | 0.500 | | | 0.0350 | " | 0.5000 | | 100% | 0-200 | |
| Benzene | 0.498 | | | 0.0350 | " | 0.5000 | | 100% | 75.7-118 | |
| n-Heptane | 0.494 | | | 0.0350 | " | 0.5000 | | 99% | 66.9-152 | |
| 1,2-Dichloropropane | 0.494 | | | 0.0350 | " | 0.5000 | | 99% | 76.8-118 | |
| Trichloroethene | 0.482 | | | 0.0350 | " | 0.5000 | | 96% | 70.1-119 | |
| Bromodichloromethane | 0.495 | | | 0.0350 | " | 0.5000 | | 99% | 75.8-117 | |
| Methyl methacrylate | 0.455 | | | 0.0350 | " | 0.5000 | | 91% | 0-200 | |
| 1,4-Dioxane | 0.467 | | | 0.0350 | " | 0.5000 | | 93% | 54.7-150 | |
| cis-1,3-Dichloropropene | 0.476 | | | 0.0350 | " | 0.5000 | | 95% | 75.5-115 | |
| 4-Methyl-2-pentanone | 0.445 | | | 0.0350 | " | 0.5000 | | 89% | 62.9-133 | |
| trans-1,3-Dichloropropene | 0.484 | | | 0.0350 | " | 0.5000 | | 97% | 75.8-117 | |



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Project Number: [none]
Project Manager: Motria Caudill

Reported:
Jan-27-15 13:05

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control US EPA Region 5 Chicago Regional Laboratory

Batch B409107 - ColdTrap Dehydration

| LCS (B409107-BS1) | | | | | | | | | | |
|--|--------|--------------------|-----|-----------|-------|-------------|---------------|-----------|------------|-----------|
| Analyte | Result | Flags / Qualifiers | MDL | Reporting | | Spike Level | Source Result | %REC %REC | Limits RPD | RPD Limit |
| | | | | Limit | Units | | | | | |
| 1,1,2-Trichloroethane | 0.468 | | | 0.0350 | ppbv | 0.5000 | | 94% | 92.3-106 | |
| Dibromochloromethane | 0.501 | | | 0.0350 | " | 0.5000 | | 100% | 69-132 | |
| Toluene | 0.490 | | | 0.0350 | " | 0.5000 | | 98% | 73.2-120 | |
| 2-Hexanone | 0.492 | | | 0.0350 | " | 0.5000 | | 98% | 76-110 | |
| 1,2-Dibromoethane (EDB) | 0.486 | | | 0.0350 | " | 0.5000 | | 97% | 75.5-118 | |
| Tetrachloroethene | 0.465 | | | 0.0350 | " | 0.5000 | | 93% | 67.1-125 | |
| Chlorobenzene | 0.499 | | | 0.0350 | " | 0.5000 | | 100% | 68.5-121 | |
| Ethylbenzene | 0.490 | | | 0.0350 | " | 0.5000 | | 98% | 74.9-118 | |
| m+p-Xylene | 0.971 | | | 0.0700 | " | 1.000 | | 97% | 79.8-121 | |
| Bromoform | 0.471 | | | 0.0350 | " | 0.5000 | | 94% | 72.4-119 | |
| Styrene | 0.471 | | | 0.0350 | " | 0.5000 | | 94% | 71.5-122 | |
| 1,1,2,2-Tetrachloroethane | 0.484 | | | 0.0350 | " | 0.5000 | | 97% | 92-106 | |
| o-Xylene | 0.485 | | | 0.0350 | " | 0.5000 | | 97% | 77.6-124 | |
| 4-ethyltoluene | 0.479 | | | 0.0350 | " | 0.5000 | | 96% | 96.7-122 | |
| 1,3,5-Trimethylbenzene | 0.488 | | | 0.0350 | " | 0.5000 | | 98% | 74.4-121 | |
| 1,2,4-Trimethylbenzene | 0.488 | | | 0.0350 | " | 0.5000 | | 98% | 71.9-126 | |
| 1,3-Dichlorobenzene | 0.482 | | | 0.0350 | " | 0.5000 | | 96% | 67.9-132 | |
| Benzyl chloride | 0.479 | | | 0.0350 | " | 0.5000 | | 96% | 60.7-134 | |
| 1,4-Dichlorobenzene | 0.478 | | | 0.0350 | " | 0.5000 | | 96% | 65.4-136 | |
| 1,2-Dichlorobenzene | 0.466 | | | 0.0350 | " | 0.5000 | | 93% | 69.3-129 | |
| 1,2,4-Trichlorobenzene | 0.482 | | | 0.0350 | " | 0.5000 | | 96% | 39.7-186 | |
| Naphthalene | 0.498 | J | | 0.0500 | " | | | | 40-200 | |
| Surrogate: Dichlorodifluoromethane | 0.497 | | | | " | 0.5000 | | 99% | 77.8-116 | |
| Surrogate: Dichlorotetrafluoroethane | 0.473 | | | | " | 0.5000 | | 95% | 89-108 | |
| Surrogate: Trichlorofluoromethane | 0.494 | | | | " | 0.5000 | | 99% | 78.6-114 | |
| Surrogate: | 0.473 | | | | " | 0.5000 | | 95% | 75.3-119 | |
| 1,1,2-trichloro-1,2,2-trifluoroethane (Freon | | | | | | | | | | |
| Surrogate: 1,1,1-Trichloroethane | 0.500 | | | | " | 0.5000 | | 100% | 92.5-105 | |
| Surrogate: Carbon tetrachloride | 0.500 | | | | " | 0.5000 | | 100% | 76.3-118 | |



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Jan-27-15 13:05

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control US EPA Region 5 Chicago Regional Laboratory

Batch B409107 - ColdTrap Dehydration

| LCS Dup (B409107-BSD1) | | | | | | | | | | |
|---------------------------|--------|--------------------|---|-----------------|-------|-------------|---------------|-----------|---------|-------------|
| Analyte | Result | Flags / Qualifiers | Prepared: Sep-25-14 Analyzed: Sep-27-14 | | | Spike Level | Source Result | %REC %REC | RPD RPD | Limit Limit |
| | | | MDL | Reporting Limit | Units | | | | | |
| Propene | 0.451 | Research | | 0.0250 | ppbv | 0.5000 | 90% | 76-112 | 2 | 19.6 |
| Chloromethane | 0.469 | | | 0.0250 | " | 0.5000 | 94% | 77.6-116 | 2 | 26.9 |
| Vinyl chloride | 0.476 | | | 0.0175 | " | 0.5000 | 95% | 77.4-117 | 5 | 25.1 |
| 1,3-butadiene | 0.468 | | | 0.0175 | " | 0.5000 | 94% | 77.7-115 | 4 | 33.2 |
| Bromomethane | 0.461 | | | 0.0175 | " | 0.5000 | 92% | 75.2-117 | 8 | 26.6 |
| Chloroethane | 0.491 | | | 0.0175 | " | 0.5000 | 98% | 79.8-114 | 0.4 | 29.5 |
| Ethanol | 0.255 | J | | 0.0175 | " | 0.5000 | 51% | 50-124 | 67 | 200 |
| Acrolein | 0.440 | | | 0.0250 | " | 0.5000 | 88% | 67.9-130 | 11 | 29.8 |
| Isopropyl alcohol | 0.392 | J | | 0.0175 | " | 0.5000 | 78% | 81-106 | 26 | 25 |
| Acetone | 0.504 | J | | 0.0250 | " | 0.5000 | 101% | 60-137 | 2 | 28.7 |
| 1,1-Dichloroethene | 0.477 | | | 0.0175 | " | 0.5000 | 95% | 77.3-118 | 3 | 15.9 |
| Methylene chloride | 0.490 | | | 0.0175 | " | 0.5000 | 98% | 78.7-117 | 2 | 20.7 |
| Methyl tert-butyl ether | 0.504 | | | 0.0175 | " | 0.5000 | 101% | 79.1-118 | 2 | 31.9 |
| 1,1-Dichloroethane | 0.496 | | | 0.0175 | " | 0.5000 | 99% | 79.8-117 | 0.2 | 13.1 |
| Vinyl acetate | 0.470 | | | 0.0175 | " | 0.5000 | 94% | 85-106 | 5 | 200 |
| Hexane | 0.498 | | | 0.0175 | " | 0.5000 | 100% | 70.1-121 | 2 | 43.5 |
| 2-Butanone | 0.502 | | | 0.0250 | " | 0.5000 | 100% | 82-108 | 4 | 25 |
| cis-1,2-Dichloroethene | 0.502 | | | 0.0175 | " | 0.5000 | 100% | 78.1-115 | 0.9 | 29.6 |
| trans-1,2-Dichloroethene | 0.507 | | | 0.0175 | " | 0.5000 | 101% | 0-200 | 3 | 25 |
| Chloroform | 0.500 | | | 0.0175 | " | 0.5000 | 100% | 79.6-115 | 0.6 | 25.2 |
| Ethyl acetate | 0.530 | | | 0.0175 | " | 0.5000 | 106% | 0-200 | 7 | 25 |
| 1,2-Dichloroethane | 0.500 | | | 0.0175 | " | 0.5000 | 100% | 79.8-115 | 0.3 | 24.6 |
| Cyclohexane | 0.456 | J | | 0.0250 | " | 0.5000 | 91% | 72.5-119 | 3 | 34.5 |
| Tetrahydrofuran | 0.510 | | | 0.0175 | " | 0.5000 | 102% | 0-200 | 2 | 25 |
| Benzene | 0.504 | | | 0.0175 | " | 0.5000 | 101% | 75.7-118 | 1 | 27.4 |
| n-Heptane | 0.508 | | | 0.0175 | " | 0.5000 | 102% | 66.9-152 | 3 | 25 |
| 1,2-Dichloropropane | 0.501 | | | 0.0175 | " | 0.5000 | 100% | 76.8-118 | 1 | 25.3 |
| Trichloroethene | 0.483 | | | 0.0175 | " | 0.5000 | 97% | 70.1-119 | 0.3 | 34.1 |
| Bromodichloromethane | 0.493 | | | 0.0175 | " | 0.5000 | 99% | 75.8-117 | 0.5 | 26.5 |
| Methyl methacrylate | 0.477 | | | 0.0175 | " | 0.5000 | 95% | 0-200 | 5 | 200 |
| 1,4-Dioxane | 0.300 | | | 0.0175 | " | 0.5000 | 60% | 54.7-150 | 43 | 58.6 |
| cis-1,3-Dichloropropene | 0.477 | | | 0.0175 | " | 0.5000 | 95% | 75.5-115 | 0.2 | 31.1 |
| 4-Methyl-2-pentanone | 0.471 | | | 0.0175 | " | 0.5000 | 94% | 62.9-133 | 6 | 42 |
| trans-1,3-Dichloropropene | 0.442 | | | 0.0175 | " | 0.5000 | 88% | 75.8-117 | 9 | 31.7 |



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Project Number: [none]
Project Manager: Motria Caudill

Reported:
Jan-27-15 13:05

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control US EPA Region 5 Chicago Regional Laboratory

Batch B409107 - ColdTrap Dehydration

| LCS Dup (B409107-BSD1) | | | | | | | | | | | Prepared: Sep-25-14 Analyzed: Sep-27-14 | | |
|--|--------|--------------------|-----|-----------------|-------|-------------|---------------|------|-------------|-----|---|--|--|
| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | | |
| 1,1,2-Trichloroethane | 0.481 | | | 0.0175 | ppbv | 0.5000 | | 96% | 92.3-106 | 3 | 11.5 | | |
| Dibromochloromethane | 0.500 | | | 0.0175 | " | 0.5000 | | 100% | 69-132 | 0.2 | 25 | | |
| Toluene | 0.497 | | | 0.0175 | " | 0.5000 | | 99% | 73.2-120 | 1 | 30.6 | | |
| 2-Hexanone | 0.514 | | | 0.0175 | " | 0.5000 | | 103% | 76-110 | 4 | 46.8 | | |
| 1,2-Dibromoethane (EDB) | 0.503 | | | 0.0175 | " | 0.5000 | | 101% | 75.5-118 | 3 | 31.5 | | |
| Tetrachloroethene | 0.497 | | | 0.0175 | " | 0.5000 | | 99% | 67.1-125 | 7 | 13.8 | | |
| Chlorobenzene | 0.493 | | | 0.0175 | " | 0.5000 | | 99% | 68.5-121 | 1 | 31.9 | | |
| Ethylbenzene | 0.501 | | | 0.0175 | " | 0.5000 | | 100% | 74.9-118 | 2 | 31.6 | | |
| m+p-Xylene | 0.983 | | | 0.0350 | " | 1.000 | | 98% | 79.8-121 | 1 | 28.9 | | |
| Bromoform | 0.481 | | | 0.0175 | " | 0.5000 | | 96% | 72.4-119 | 2 | 34.6 | | |
| Styrene | 0.449 | | | 0.0175 | " | 0.5000 | | 90% | 71.5-122 | 5 | 19.7 | | |
| 1,1,2,2-Tetrachloroethane | 0.520 | | | 0.0175 | " | 0.5000 | | 104% | 92-106 | 7 | 11.5 | | |
| o-Xylene | 0.508 | | | 0.0175 | " | 0.5000 | | 102% | 77.6-124 | 5 | 28.7 | | |
| 4-ethyltoluene | 0.499 | | | 0.0175 | " | 0.5000 | | 100% | 96.7-122 | 4 | 25 | | |
| 1,3,5-Trimethylbenzene | 0.498 | | | 0.0175 | " | 0.5000 | | 100% | 74.4-121 | 2 | 29.8 | | |
| 1,2,4-Trimethylbenzene | 0.502 | | | 0.0175 | " | 0.5000 | | 100% | 71.9-126 | 3 | 32.1 | | |
| 1,3-Dichlorobenzene | 0.466 | | | 0.0175 | " | 0.5000 | | 93% | 67.9-132 | 3 | 37.9 | | |
| Benzyl chloride | 0.474 | | | 0.0175 | " | 0.5000 | | 95% | 60.7-134 | 1 | 48.3 | | |
| 1,4-Dichlorobenzene | 0.452 | | | 0.0175 | " | 0.5000 | | 90% | 65.4-136 | 6 | 39.6 | | |
| 1,2-Dichlorobenzene | 0.506 | | | 0.0175 | " | 0.5000 | | 101% | 69.3-129 | 8 | 34 | | |
| 1,2,4-Trichlorobenzene | 0.537 | | | 0.0175 | " | 0.5000 | | 107% | 39.7-186 | 11 | 77.1 | | |
| Naphthalene | 2.28 | J | | 0.0250 | " | | | | 40-200 | 128 | 200 | | |
| Surrogate: Dichlorodifluoromethane | 0.528 | | | | " | 0.5000 | | 106% | 77.8-116 | | | | |
| Surrogate: Dichlorotetrafluoroethane | 0.540 | | | | " | 0.5000 | | 108% | 89-108 | | | | |
| Surrogate: Trichlorofluoromethane | 0.489 | | | | " | 0.5000 | | 98% | 78.6-114 | | | | |
| Surrogate: | 0.468 | | | | " | 0.5000 | | 94% | 75.3-119 | | | | |
| 1,1,2-trichloro-1,2,2-trifluoroethane (Freon | | | | | | | | | | | | | |
| Surrogate: 1,1,1-Trichloroethane | 0.513 | | | | " | 0.5000 | | 103% | 92.5-105 | | | | |
| Surrogate: Carbon tetrachloride | 0.505 | | | | " | 0.5000 | | 101% | 76.3-118 | | | | |



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Project Number: [none]
Project Manager: Motria Caudill

Reported:
Jan-27-15 13:05

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control
US EPA Region 5 Chicago Regional Laboratory

Batch B412022 - ColdTrap Dehydration

Blank (B412022-BLK1)

Prepared & Analyzed: Sep-29-14

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---------------------------|---------------|--------------------|-----|-----------------|-------|-------------|---------------|------|-------------|-----|-----------|
| Propene | 0.0812 | Research | | 0.0500 | ppbv | | | | | | |
| Chloromethane | U | | | 0.0500 | " | | | | | | |
| Vinyl chloride | U | | | 0.0350 | " | | | | | | |
| 1,3-butadiene | U | | | 0.0350 | " | | | | | | |
| Bromomethane | U | | | 0.0350 | " | | | | | | |
| Chloroethane | U | | | 0.0350 | " | | | | | | |
| Ethanol | 0.0758 | J | | 0.0350 | " | | | | | | |
| Acrolein | U | | | 0.0500 | " | | | | | | |
| Isopropyl alcohol | U | J | | 0.0350 | " | | | | | | |
| Acetone | U | J | | 0.0500 | " | | | | | | |
| 1,1-Dichloroethene | U | | | 0.0350 | " | | | | | | |
| Methylene chloride | U | | | 0.0350 | " | | | | | | |
| Methyl tert-butyl ether | U | | | 0.0350 | " | | | | | | |
| 1,1-Dichloroethane | U | | | 0.0350 | " | | | | | | |
| Vinyl acetate | U | | | 0.0350 | " | | | | | | |
| Hexane | U | | | 0.0350 | " | | | | | | |
| 2-Butanone | U | | | 0.0500 | " | | | | | | |
| cis-1,2-Dichloroethene | U | | | 0.0350 | " | | | | | | |
| trans-1,2-Dichloroethene | U | | | 0.0350 | " | | | | | | |
| Chloroform | U | | | 0.0350 | " | | | | | | |
| Ethyl acetate | U | | | 0.0350 | " | | | | | | |
| 1,2-Dichloroethane | U | | | 0.0350 | " | | | | | | |
| Cyclohexane | U | J | | 0.0500 | " | | | | | | |
| Tetrahydrofuran | U | | | 0.0350 | " | | | | | | |
| Benzene | U | | | 0.0350 | " | | | | | | |
| n-Heptane | U | | | 0.0350 | " | | | | | | |
| 1,2-Dichloropropane | U | | | 0.0350 | " | | | | | | |
| Trichloroethene | U | | | 0.0350 | " | | | | | | |
| Bromodichloromethane | U | | | 0.0350 | " | | | | | | |
| Methyl methacrylate | U | | | 0.0350 | " | | | | | | |
| 1,4-Dioxane | U | | | 0.0350 | " | | | | | | |
| cis-1,3-Dichloropropene | U | | | 0.0350 | " | | | | | | |
| 4-Methyl-2-pentanone | U | | | 0.0350 | " | | | | | | |
| trans-1,3-Dichloropropene | U | | | 0.0350 | " | | | | | | |



Environmental Protection Agency Region 5
Chicago Regional Laboratory

536 South Clark Street, Chicago, IL 60605
Phone:(312)353-8370 Fax:(312)886-2591

Air Division, US EPA Region 5
77 West Jackson Boulevard
Chicago IL, 60605

Project: BP Whiting Refinery
Project Number: [none]
Project Manager: Motria Caudill

Reported:
Jan-27-15 13:05

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control
US EPA Region 5 Chicago Regional Laboratory

Batch B412022 - ColdTrap Dehydration

Blank (B412022-BLK1)

Prepared & Analyzed: Sep-29-14

| Analyte | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|--|--------|--------------------|-----|-----------------|-------|-------------|---------------|------|-------------|-----|-----------|
| 1,1,2-Trichloroethane | U | | | 0.0350 | ppbv | | | | | | |
| Dibromochloromethane | U | | | 0.0350 | " | | | | | | |
| Toluene | U | | | 0.0350 | " | | | | | | |
| 2-Hexanone | U | | | 0.0350 | " | | | | | | |
| 1,2-Dibromoethane (EDB) | U | | | 0.0350 | " | | | | | | |
| Tetrachloroethene | U | | | 0.0350 | " | | | | | | |
| Chlorobenzene | U | | | 0.0350 | " | | | | | | |
| Ethylbenzene | U | | | 0.0350 | " | | | | | | |
| m+p-Xylene | U | | | 0.0700 | " | | | | | | |
| Bromoform | U | | | 0.0350 | " | | | | | | |
| Styrene | U | | | 0.0350 | " | | | | | | |
| 1,1,2,2-Tetrachloroethane | U | | | 0.0350 | " | | | | | | |
| o-Xylene | U | | | 0.0350 | " | | | | | | |
| 4-ethyltoluene | U | | | 0.0350 | " | | | | | | |
| 1,3,5-Trimethylbenzene | U | | | 0.0350 | " | | | | | | |
| 1,2,4-Trimethylbenzene | U | | | 0.0350 | " | | | | | | |
| 1,3-Dichlorobenzene | U | | | 0.0350 | " | | | | | | |
| Benzyl chloride | U | | | 0.0350 | " | | | | | | |
| 1,4-Dichlorobenzene | U | | | 0.0350 | " | | | | | | |
| 1,2-Dichlorobenzene | U | | | 0.0350 | " | | | | | | |
| 1,2,4-Trichlorobenzene | U | | | 0.0350 | " | | | | | | |
| Naphthalene | 0.0878 | J | | 0.0500 | " | | | | | | |
| Surrogate: Dichlorodifluoromethane | U | | | | " | 0.5100 | | % | 90-120 | | |
| Surrogate: Dichlorotetrafluoroethane | U | | | | " | 2.000E-2 | | % | 80-120 | | |
| Surrogate: Trichlorofluoromethane | U | | | | " | 0.2350 | | % | 90-120 | | |
| Surrogate: | U | | | | " | 7.200E-2 | | % | 90-120 | | |
| 1,1,2-trichloro-1,2,2-trifluoroethane (Freon | | | | | | | | | | | |
| Surrogate: 1,1,1-Trichloroethane | U | | | | " | 4.000E-3 | | % | 80-120 | | |
| Surrogate: Carbon tetrachloride | U | | | | " | 8.300E-2 | | % | 80-120 | | |



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Air Division, US EPA Region 5
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Project: BP Whiting Refinery
Project Number: [none]
Project Manager: Motria Caudill

Reported:
Jan-27-15 13:05

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control US EPA Region 5 Chicago Regional Laboratory

Batch B412022 - ColdTrap Dehydration

| Prepared & Analyzed: Sep-29-14 | | | | | | | | | | | |
|--------------------------------|--------|--------------------|-----|-----------------|-------|-------------|---------------|------|-------------|-----|-----------|
| LCS (B412022-BS1) | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
| Propene | 0.517 | Research | | 0.0500 | ppbv | 0.5000 | | 103% | 76-112 | | |
| Chloromethane | 0.465 | | | 0.0500 | " | 0.5000 | | 93% | 77.6-116 | | |
| Vinyl chloride | 0.491 | | | 0.0350 | " | 0.5000 | | 98% | 77.4-117 | | |
| 1,3-butadiene | 0.487 | | | 0.0350 | " | 0.5000 | | 97% | 77.7-115 | | |
| Bromomethane | 0.483 | | | 0.0350 | " | 0.5000 | | 97% | 75.2-117 | | |
| Chloroethane | 0.483 | | | 0.0350 | " | 0.5000 | | 97% | 79.8-114 | | |
| Ethanol | 0.606 | J | | 0.0350 | " | 0.5000 | | 121% | 50-124 | | |
| Acrolein | 0.502 | | | 0.0500 | " | 0.5000 | | 100% | 67.9-130 | | |
| Isopropyl alcohol | 0.388 | J | | 0.0350 | " | 0.5000 | | 78% | 81-106 | | |
| Acetone | 0.508 | J | | 0.0500 | " | 0.5000 | | 102% | 60-137 | | |
| 1,1-Dichloroethene | 0.497 | | | 0.0350 | " | 0.5000 | | 99% | 77.3-118 | | |
| Methylene chloride | 0.490 | | | 0.0350 | " | 0.5000 | | 98% | 78.7-117 | | |
| Methyl tert-butyl ether | 0.496 | | | 0.0350 | " | 0.5000 | | 99% | 79.1-118 | | |
| 1,1-Dichloroethane | 0.475 | | | 0.0350 | " | 0.5000 | | 95% | 79.8-117 | | |
| Vinyl acetate | 0.505 | | | 0.0350 | " | 0.5000 | | 101% | 85-106 | | |
| Hexane | 0.477 | | | 0.0350 | " | 0.5000 | | 95% | 70.1-121 | | |
| 2-Butanone | 0.475 | | | 0.0500 | " | 0.5000 | | 95% | 82-108 | | |
| cis-1,2-Dichloroethene | 0.488 | | | 0.0350 | " | 0.5000 | | 98% | 78.1-115 | | |
| trans-1,2-Dichloroethene | 0.491 | | | 0.0350 | " | 0.5000 | | 98% | 0-200 | | |
| Chloroform | 0.464 | | | 0.0350 | " | 0.5000 | | 93% | 79.6-115 | | |
| Ethyl acetate | 0.480 | | | 0.0350 | " | 0.5000 | | 96% | 0-200 | | |
| 1,2-Dichloroethane | 0.467 | | | 0.0350 | " | 0.5000 | | 93% | 79.8-115 | | |
| Cyclohexane | 0.453 | J | | 0.0500 | " | 0.5000 | | 91% | 72.5-119 | | |
| Tetrahydrofuran | 0.486 | | | 0.0350 | " | 0.5000 | | 97% | 0-200 | | |
| Benzene | 0.473 | | | 0.0350 | " | 0.5000 | | 95% | 75.7-118 | | |
| n-Heptane | 0.478 | | | 0.0350 | " | 0.5000 | | 96% | 66.9-152 | | |
| 1,2-Dichloropropane | 0.477 | | | 0.0350 | " | 0.5000 | | 95% | 76.8-118 | | |
| Trichloroethene | 0.464 | | | 0.0350 | " | 0.5000 | | 93% | 70.1-119 | | |
| Bromodichloromethane | 0.490 | | | 0.0350 | " | 0.5000 | | 98% | 75.8-117 | | |
| Methyl methacrylate | 0.503 | | | 0.0350 | " | 0.5000 | | 101% | 0-200 | | |
| 1,4-Dioxane | 0.497 | | | 0.0350 | " | 0.5000 | | 99% | 54.7-150 | | |
| cis-1,3-Dichloropropene | 0.517 | | | 0.0350 | " | 0.5000 | | 103% | 75.5-115 | | |
| 4-Methyl-2-pentanone | 0.487 | | | 0.0350 | " | 0.5000 | | 97% | 62.9-133 | | |
| trans-1,3-Dichloropropene | 0.518 | | | 0.0350 | " | 0.5000 | | 104% | 75.8-117 | | |



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Air Division, US EPA Region 5
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Project: BP Whiting Refinery
Project Number: [none]
Project Manager: Motria Caudill

Reported:
Jan-27-15 13:05

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control US EPA Region 5 Chicago Regional Laboratory

Batch B412022 - ColdTrap Dehydration

| Prepared & Analyzed: Sep-29-14 | | | | | | | | | | | |
|--|--------|--------------------|-----|-----------------|-------|-------------|---------------|------|-------------|-----|-----------|
| LCS (B412022-BS1) | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
| 1,1,2-Trichloroethane | 0.483 | | | 0.0350 | ppbv | 0.5000 | | 97% | 92.3-106 | | |
| Dibromochloromethane | 0.536 | | | 0.0350 | " | 0.5000 | | 107% | 69-132 | | |
| Toluene | 0.517 | | | 0.0350 | " | 0.5000 | | 103% | 73.2-120 | | |
| 2-Hexanone | 0.516 | | | 0.0350 | " | 0.5000 | | 103% | 76-110 | | |
| 1,2-Dibromoethane (EDB) | 0.516 | | | 0.0350 | " | 0.5000 | | 103% | 75.5-118 | | |
| Tetrachloroethene | 0.495 | | | 0.0350 | " | 0.5000 | | 99% | 67.1-125 | | |
| Chlorobenzene | 0.495 | | | 0.0350 | " | 0.5000 | | 99% | 68.5-121 | | |
| Ethylbenzene | 0.493 | | | 0.0350 | " | 0.5000 | | 99% | 74.9-118 | | |
| m+p-Xylene | 0.990 | | | 0.0700 | " | 1.000 | | 99% | 79.8-121 | | |
| Bromoform | 0.483 | | | 0.0350 | " | 0.5000 | | 97% | 72.4-119 | | |
| Styrene | 0.493 | | | 0.0350 | " | 0.5000 | | 99% | 71.5-122 | | |
| 1,1,2,2-Tetrachloroethane | 0.486 | | | 0.0350 | " | 0.5000 | | 97% | 92-106 | | |
| o-Xylene | 0.496 | | | 0.0350 | " | 0.5000 | | 99% | 77.6-124 | | |
| 4-ethyltoluene | 0.491 | | | 0.0350 | " | 0.5000 | | 98% | 96.7-122 | | |
| 1,3,5-Trimethylbenzene | 0.496 | | | 0.0350 | " | 0.5000 | | 99% | 74.4-121 | | |
| 1,2,4-Trimethylbenzene | 0.498 | | | 0.0350 | " | 0.5000 | | 100% | 71.9-126 | | |
| 1,3-Dichlorobenzene | 0.475 | | | 0.0350 | " | 0.5000 | | 95% | 67.9-132 | | |
| Benzyl chloride | 0.519 | | | 0.0350 | " | 0.5000 | | 104% | 60.7-134 | | |
| 1,4-Dichlorobenzene | 0.480 | | | 0.0350 | " | 0.5000 | | 96% | 65.4-136 | | |
| 1,2-Dichlorobenzene | 0.504 | | | 0.0350 | " | 0.5000 | | 101% | 69.3-129 | | |
| 1,2,4-Trichlorobenzene | 0.608 | | | 0.0350 | " | 0.5000 | | 122% | 39.7-186 | | |
| Naphthalene | 0.716 | J | | 0.0500 | " | | | | 40-200 | | |
| Surrogate: Dichlorodifluoromethane | 0.472 | | | | " | 0.5000 | | 94% | 77.8-116 | | |
| Surrogate: Dichlorotetrafluoroethane | 0.459 | | | | " | 0.5000 | | 92% | 89-108 | | |
| Surrogate: Trichlorofluoromethane | 0.488 | | | | " | 0.5000 | | 98% | 78.6-114 | | |
| Surrogate: | 0.465 | | | | " | 0.5000 | | 93% | 75.3-119 | | |
| 1,1,2-trichloro-1,2,2-trifluoroethane (Freon | | | | | | | | | | | |
| Surrogate: 1,1,1-Trichloroethane | 0.471 | | | | " | 0.5000 | | 94% | 92.5-105 | | |
| Surrogate: Carbon tetrachloride | 0.477 | | | | " | 0.5000 | | 95% | 76.3-118 | | |



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Air Division, US EPA Region 5
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Project: BP Whiting Refinery
Project Number: [none]
Project Manager: Motria Caudill

Reported:
Jan-27-15 13:05

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control US EPA Region 5 Chicago Regional Laboratory

Batch B412022 - ColdTrap Dehydration

| Prepared & Analyzed: Sep-29-14 | | | | | | | | | | | |
|--------------------------------|--------|--------------------|-----|-----------------|-------|-------------|---------------|------|-------------|-----|-----------|
| LCS Dup (B412022-BSD1) | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
| Propene | 0.427 | Research | | 0.0500 | ppbv | 0.5000 | | 85% | 76-112 | 19 | 19.6 |
| Chloromethane | 0.471 | | | 0.0500 | " | 0.5000 | | 94% | 77.6-116 | 1 | 26.9 |
| Vinyl chloride | 0.461 | | | 0.0350 | " | 0.5000 | | 92% | 77.4-117 | 6 | 25.1 |
| 1,3-butadiene | 0.437 | | | 0.0350 | " | 0.5000 | | 87% | 77.7-115 | 11 | 33.2 |
| Bromomethane | 0.476 | | | 0.0350 | " | 0.5000 | | 95% | 75.2-117 | 2 | 26.6 |
| Chloroethane | 0.469 | | | 0.0350 | " | 0.5000 | | 94% | 79.8-114 | 3 | 29.5 |
| Ethanol | 0.510 | J | | 0.0350 | " | 0.5000 | | 102% | 50-124 | 17 | 200 |
| Acrolein | 0.460 | | | 0.0500 | " | 0.5000 | | 92% | 67.9-130 | 9 | 29.8 |
| Isopropyl alcohol | 0.329 | J | | 0.0350 | " | 0.5000 | | 66% | 81-106 | 16 | 25 |
| Acetone | 0.463 | J | | 0.0500 | " | 0.5000 | | 93% | 60-137 | 9 | 28.7 |
| 1,1-Dichloroethene | 0.478 | | | 0.0350 | " | 0.5000 | | 96% | 77.3-118 | 4 | 15.9 |
| Methylene chloride | 0.482 | | | 0.0350 | " | 0.5000 | | 96% | 78.7-117 | 2 | 20.7 |
| Methyl tert-butyl ether | 0.466 | | | 0.0350 | " | 0.5000 | | 93% | 79.1-118 | 6 | 31.9 |
| 1,1-Dichloroethane | 0.470 | | | 0.0350 | " | 0.5000 | | 94% | 79.8-117 | 1 | 13.1 |
| Vinyl acetate | 0.465 | | | 0.0350 | " | 0.5000 | | 93% | 85-106 | 8 | 200 |
| Hexane | 0.459 | | | 0.0350 | " | 0.5000 | | 92% | 70.1-121 | 4 | 43.5 |
| 2-Butanone | 0.469 | | | 0.0500 | " | 0.5000 | | 94% | 82-108 | 1 | 25 |
| cis-1,2-Dichloroethene | 0.475 | | | 0.0350 | " | 0.5000 | | 95% | 78.1-115 | 3 | 29.6 |
| trans-1,2-Dichloroethene | 0.480 | | | 0.0350 | " | 0.5000 | | 96% | 0-200 | 2 | 25 |
| Chloroform | 0.492 | | | 0.0350 | " | 0.5000 | | 98% | 79.6-115 | 6 | 25.2 |
| Ethyl acetate | 0.487 | | | 0.0350 | " | 0.5000 | | 97% | 0-200 | 1 | 25 |
| 1,2-Dichloroethane | 0.494 | | | 0.0350 | " | 0.5000 | | 99% | 79.8-115 | 6 | 24.6 |
| Cyclohexane | 0.495 | J | | 0.0500 | " | 0.5000 | | 99% | 72.5-119 | 9 | 34.5 |
| Tetrahydrofuran | 0.479 | | | 0.0350 | " | 0.5000 | | 96% | 0-200 | 2 | 25 |
| Benzene | 0.478 | | | 0.0350 | " | 0.5000 | | 96% | 75.7-118 | 1 | 27.4 |
| n-Heptane | 0.464 | | | 0.0350 | " | 0.5000 | | 93% | 66.9-152 | 3 | 25 |
| 1,2-Dichloropropane | 0.520 | | | 0.0350 | " | 0.5000 | | 104% | 76.8-118 | 9 | 25.3 |
| Trichloroethene | 0.480 | | | 0.0350 | " | 0.5000 | | 96% | 70.1-119 | 4 | 34.1 |
| Bromodichloromethane | 0.532 | | | 0.0350 | " | 0.5000 | | 106% | 75.8-117 | 8 | 26.5 |
| Methyl methacrylate | 0.471 | | | 0.0350 | " | 0.5000 | | 94% | 0-200 | 6 | 200 |
| 1,4-Dioxane | 0.475 | | | 0.0350 | " | 0.5000 | | 95% | 54.7-150 | 5 | 58.6 |
| cis-1,3-Dichloropropene | 0.511 | | | 0.0350 | " | 0.5000 | | 102% | 75.5-115 | 1 | 31.1 |
| 4-Methyl-2-pentanone | 0.474 | | | 0.0350 | " | 0.5000 | | 95% | 62.9-133 | 3 | 42 |
| trans-1,3-Dichloropropene | 0.522 | | | 0.0350 | " | 0.5000 | | 104% | 75.8-117 | 0.8 | 31.7 |



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Project: BP Whiting Refinery
Project Number: [none]
Project Manager: Motria Caudill

Reported:
Jan-27-15 13:05

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control US EPA Region 5 Chicago Regional Laboratory

Batch B412022 - ColdTrap Dehydration

| Prepared & Analyzed: Sep-29-14 | | | | | | | | | | | |
|--|--------|--------------------|-----|-----------------|-------|-------------|---------------|------|-------------|-----|-----------|
| LCS Dup (B412022-BSD1) | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
| 1,1,2-Trichloroethane | 0.509 | | | 0.0350 | ppbv | 0.5000 | | 102% | 92.3-106 | 5 | 11.5 |
| Dibromochloromethane | 0.551 | | | 0.0350 | " | 0.5000 | | 110% | 69-132 | 3 | 25 |
| Toluene | 0.501 | | | 0.0350 | " | 0.5000 | | 100% | 73.2-120 | 3 | 30.6 |
| 2-Hexanone | 0.512 | | | 0.0350 | " | 0.5000 | | 102% | 76-110 | 0.7 | 46.8 |
| 1,2-Dibromoethane (EDB) | 0.529 | | | 0.0350 | " | 0.5000 | | 106% | 75.5-118 | 3 | 31.5 |
| Tetrachloroethene | 0.503 | | | 0.0350 | " | 0.5000 | | 101% | 67.1-125 | 2 | 13.8 |
| Chlorobenzene | 0.506 | | | 0.0350 | " | 0.5000 | | 101% | 68.5-121 | 2 | 31.9 |
| Ethylbenzene | 0.487 | | | 0.0350 | " | 0.5000 | | 97% | 74.9-118 | 1 | 31.6 |
| m+p-Xylene | 0.959 | | | 0.0700 | " | 1.000 | | 96% | 79.8-121 | 3 | 28.9 |
| Bromoform | 0.509 | | | 0.0350 | " | 0.5000 | | 102% | 72.4-119 | 5 | 34.6 |
| Styrene | 0.479 | | | 0.0350 | " | 0.5000 | | 96% | 71.5-122 | 3 | 19.7 |
| 1,1,2,2-Tetrachloroethane | 0.522 | | | 0.0350 | " | 0.5000 | | 104% | 92-106 | 7 | 11.5 |
| o-Xylene | 0.481 | | | 0.0350 | " | 0.5000 | | 96% | 77.6-124 | 3 | 28.7 |
| 4-ethyltoluene | 0.478 | | | 0.0350 | " | 0.5000 | | 96% | 96.7-122 | 3 | 25 |
| 1,3,5-Trimethylbenzene | 0.473 | | | 0.0350 | " | 0.5000 | | 95% | 74.4-121 | 5 | 29.8 |
| 1,2,4-Trimethylbenzene | 0.480 | | | 0.0350 | " | 0.5000 | | 96% | 71.9-126 | 4 | 32.1 |
| 1,3-Dichlorobenzene | 0.485 | | | 0.0350 | " | 0.5000 | | 97% | 67.9-132 | 2 | 37.9 |
| Benzyl chloride | 0.528 | | | 0.0350 | " | 0.5000 | | 106% | 60.7-134 | 2 | 48.3 |
| 1,4-Dichlorobenzene | 0.492 | | | 0.0350 | " | 0.5000 | | 98% | 65.4-136 | 2 | 39.6 |
| 1,2-Dichlorobenzene | 0.503 | | | 0.0350 | " | 0.5000 | | 101% | 69.3-129 | 0.2 | 34 |
| 1,2,4-Trichlorobenzene | 0.563 | | | 0.0350 | " | 0.5000 | | 113% | 39.7-186 | 8 | 77.1 |
| Naphthalene | 0.611 | J | | 0.0500 | " | | | | 40-200 | 16 | 200 |
| Surrogate: Dichlorodifluoromethane | 0.449 | | | | " | 0.5000 | | 90% | 77.8-116 | | |
| Surrogate: Dichlorotetrafluoroethane | 0.449 | | | | " | 0.5000 | | 90% | 89-108 | | |
| Surrogate: Trichlorofluoromethane | 0.477 | | | | " | 0.5000 | | 95% | 78.6-114 | | |
| Surrogate: | 0.468 | | | | " | 0.5000 | | 94% | 75.3-119 | | |
| 1,1,2-trichloro-1,2,2-trifluoroethane (Freon | | | | | | | | | | | |
| Surrogate: 1,1,1-Trichloroethane | 0.494 | | | | " | 0.5000 | | 99% | 92.5-105 | | |
| Surrogate: Carbon tetrachloride | 0.499 | | | | " | 0.5000 | | 100% | 76.3-118 | | |



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Chicago Regional Laboratory

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Project: BP Whiting Refinery
Project Number: [none]
Project Manager: Motria Caudill

Reported:
Jan-27-15 13:05

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control
US EPA Region 5 Chicago Regional Laboratory

Batch B412022 - ColdTrap Dehydration

| Duplicate (B412022-DUP1) | | Source: 1409014-05RE1 | | Prepared & Analyzed: Sep-29-14 | | | | | | | | |
|---------------------------|--|-----------------------|--------------------|--------------------------------|-----------------|-------|-------------|---------------|------|-------------|-----|-----------|
| Analyte | | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
| Propene | | 1.27 | K, Research | | 0.0500 | ppbv | | 1.19 | | | 6 | 30 |
| Chloromethane | | 0.499 | | | 0.0500 | " | | 0.531 | | | 6 | 30 |
| Vinyl chloride | | U | | | 0.0350 | " | | U | | | | 30 |
| 1,3-butadiene | | 0.0313 | K | | 0.0350 | " | | U | | | | 30 |
| Bromomethane | | 6.96E-3 | | | 0.0350 | " | | U | | | | 30 |
| Chloroethane | | 6.94E-3 | | | 0.0350 | " | | U | | | | 30 |
| Ethanol | | 1.40 | J | | 0.0350 | " | | 1.25 | | | 12 | 40 |
| Acrolein | | 0.531 | K | | 0.0500 | " | | U | | | | 40 |
| Isopropyl alcohol | | 0.0335 | J | | 0.0350 | " | | U | | | | 40 |
| Acetone | | 2.49 | J | | 0.0500 | " | | 2.32 | | | 7 | 40 |
| 1,1-Dichloroethene | | U | | | 0.0350 | " | | U | | | | 30 |
| Methylene chloride | | 0.113 | | | 0.0350 | " | | 0.0868 | | | 27 | 30 |
| Methyl tert-butyl ether | | U | | | 0.0350 | " | | U | | | | 40 |
| 1,1-Dichloroethane | | U | | | 0.0350 | " | | U | | | | 30 |
| Vinyl acetate | | 5.31E-3 | | | 0.0350 | " | | U | | | | 40 |
| Hexane | | 0.380 | | | 0.0350 | " | | 0.362 | | | 5 | 30 |
| 2-Butanone | | 1.38 | | | 0.0500 | " | | 1.37 | | | 1 | 40 |
| cis-1,2-Dichloroethene | | U | | | 0.0350 | " | | U | | | | 30 |
| trans-1,2-Dichloroethene | | U | | | 0.0350 | " | | U | | | | 30 |
| Chloroform | | 0.0202 | | | 0.0350 | " | | U | | | | 30 |
| Ethyl acetate | | 0.0688 | | | 0.0350 | " | | 0.0702 | | | 2 | 40 |
| 1,2-Dichloroethane | | 0.0126 | | | 0.0350 | " | | U | | | | 30 |
| Cyclohexane | | 0.292 | J | | 0.0500 | " | | 0.484 | | | 50 | 30 |
| Tetrahydrofuran | | U | | | 0.0350 | " | | U | | | | 40 |
| Benzene | | 0.221 | | | 0.0350 | " | | 0.212 | | | 4 | 30 |
| n-Heptane | | 0.190 | | | 0.0350 | " | | 0.189 | | | 0.5 | 30 |
| 1,2-Dichloropropane | | U | | | 0.0350 | " | | U | | | | 30 |
| Trichloroethene | | U | | | 0.0350 | " | | U | | | | 30 |
| Bromodichloromethane | | U | | | 0.0350 | " | | U | | | | 30 |
| Methyl methacrylate | | U | | | 0.0350 | " | | U | | | | 40 |
| 1,4-Dioxane | | U | | | 0.0350 | " | | U | | | | 40 |
| cis-1,3-Dichloropropene | | U | | | 0.0350 | " | | U | | | | 30 |
| 4-Methyl-2-pentanone | | 0.501 | | | 0.0350 | " | | 0.372 | | | 30 | 40 |
| trans-1,3-Dichloropropene | | U | | | 0.0350 | " | | U | | | | 30 |



Environmental Protection Agency Region 5
Chicago Regional Laboratory

536 South Clark Street, Chicago, IL 60605
Phone:(312)353-8370 Fax:(312)886-2591

Air Division, US EPA Region 5
77 West Jackson Boulevard
Chicago IL, 60605

Project: BP Whiting Refinery
Project Number: [none]
Project Manager: Motria Caudill

Reported:
Jan-27-15 13:05

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control
US EPA Region 5 Chicago Regional Laboratory

Batch B412022 - ColdTrap Dehydration

| Duplicate (B412022-DUP1) | | Source: 1409014-05RE1 | | Prepared & Analyzed: Sep-29-14 | | | | | | | | |
|--|--|-----------------------|--------------------|--------------------------------|-----------------|-------|-------------|---------------|------|--------|-----|-----------|
| Analyte | | Result | Flags / Qualifiers | MDL | Reporting Limit | Units | Spike Level | Source Result | %REC | Limits | RPD | RPD Limit |
| 1,1,2-Trichloroethane | | U | | | 0.0350 | ppbv | | U | | | 30 | |
| Dibromochloromethane | | U | | | 0.0350 | " | | U | | | 30 | |
| Toluene | | 0.727 | | | 0.0350 | " | | 0.673 | | 8 | 30 | |
| 2-Hexanone | | U | | | 0.0350 | " | | U | | | 40 | |
| 1,2-Dibromoethane (EDB) | | U | | | 0.0350 | " | | U | | | 30 | |
| Tetrachloroethene | | 0.0119 | | | 0.0350 | " | | U | | | 30 | |
| Chlorobenzene | | U | | | 0.0350 | " | | U | | | 30 | |
| Ethylbenzene | | 0.200 | | | 0.0350 | " | | 0.202 | | 0.9 | 30 | |
| m+p-Xylene | | 0.620 | | | 0.0700 | " | | 0.604 | | 3 | 30 | |
| Bromoform | | U | | | 0.0350 | " | | U | | | 30 | |
| Styrene | | 0.0251 | | | 0.0350 | " | | U | | | 30 | |
| 1,1,2,2-Tetrachloroethane | | U | | | 0.0350 | " | | U | | | 30 | |
| o-Xylene | | 0.217 | | | 0.0350 | " | | 0.213 | | 2 | 30 | |
| 4-ethyltoluene | | 0.0964 | K | | 0.0350 | " | | U | | | 30 | |
| 1,3,5-Trimethylbenzene | | 0.0232 | | | 0.0350 | " | | 0.0272 | | 16 | 30 | |
| 1,2,4-Trimethylbenzene | | 0.0849 | | | 0.0350 | " | | 0.0802 | | 6 | 30 | |
| 1,3-Dichlorobenzene | | U | | | 0.0350 | " | | U | | | 30 | |
| Benzyl chloride | | U | | | 0.0350 | " | | U | | | 30 | |
| 1,4-Dichlorobenzene | | U | | | 0.0350 | " | | U | | | 30 | |
| 1,2-Dichlorobenzene | | U | | | 0.0350 | " | | U | | | 30 | |
| 1,2,4-Trichlorobenzene | | U | | | 0.0350 | " | | U | | | 30 | |
| Naphthalene | | 0.615 | J | | 0.0500 | " | | 1.22 | | 66 | 30 | |
| Surrogate: Dichlorodifluoromethane | | 0.459 | | | | " | 0.5100 | | 90% | 70-130 | | |
| Surrogate: Dichlorotetrafluoroethane | | 0.0210 | J | | | " | 2.000E-2 | | 105% | 50-150 | | |
| Surrogate: Trichlorofluoromethane | | 0.214 | | | | " | 0.2350 | | 91% | 70-130 | | |
| Surrogate: | | 0.0775 | | | | " | 7.200E-2 | | 108% | 70-130 | | |
| 1,1,2-trichloro-1,2,2-trifluoroethane (Freon | | | | | | | | | | | | |
| Surrogate: 1,1,1-Trichloroethane | | 3.49E-3 | J | | | " | 4.000E-3 | | 87% | 50-150 | | |
| Surrogate: Carbon tetrachloride | | 0.0774 | | | | " | 8.300E-2 | | 93% | 70-130 | | |



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Project: BP Whiting Refinery
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Notes and Definitions

- Research Samples analyzed while the method is under development and contain results of unknown quality. No SOP in place at time of data release. Client was notified and accepted the terms as stated.
- K The identification of the analyte is acceptable; the reported value may be biased high. The actual value is expected to be less than the reported value.
- J The identification of the analyte is acceptable; the reported value is an estimate.
- BC Analyte is detected in the sample within 5x the amount detected in the canister certification blank and may have a high bias from residual contamination in the canister used to sample.
- B Analyte concentration is < 5x that in the associated method blank(s); this concentration may be a high-bias estimate.
- U Not Detected
- NR Not Reported